

REMARKS

Claims 10-14, 16-22, and 24-29 are pending in the present Application. Claim 10, and been amended and claims 16-17 and 24-25 have been cancelled, claims 1-9, 15, and 23 have been previously cancelled, and claims 26-29 have been withdrawn, leaving claims 10-14 and 18-22 for consideration upon entry of the present Amendment.

Support for the amendment to claim 10 can be found at least in Examples 6 to 11 in the Specification as originally filed on pp. 17, line 21 to pp. 25, and Table 4 on p. 22 of the specification as originally filed.

Entry of these Amendments is respectfully requested, as they introduce no new matter, and place the claims in better condition for appeal.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Claim 10 and claims 16-17 and 24-25 stand rejected based on a discrepancy between compound names in claim 10 and compounds in the dependent claims. Claims 16-17 and 24-25 have been cancelled by this amendment, thereby rendering the rejection moot.

Reconsideration is respectfully requested, as claim 10 is now distinctly claimed.

Claim Rejections Under 35 U.S.C. § 102(b)/§ 103(a)

Claims 10-14, 16-22, and 24-25 stand rejected under 35 U.S.C. § 102(b) as being allegedly anticipated by, or in the alternative as obvious over, Kozuki et al. (JP 2003-22838, hereinafter “Kozuki”) as stated on pages 4-5 of the Final Office Action. The Examiner states that Kozuki teaches all of the elements of claims 10-14, 16-22, and 24-25, and that the additives would inherently have the claimed oxidation potential. (Final Office Action, pp. 4-5) The Applicants respectfully traverse these rejections for at least the following reasons and address them together.

To anticipate a claim, a reference must disclose each and every limitation of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987). Moreover, the single

source must disclose all of the claimed elements “arranged as in the claim.” *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 716, 223 U.S.P.Q. 1264, 1274 (Fed. Cir. 1984). Missing elements may not be supplied by the knowledge of one skilled in the art or the disclosure of another reference. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 780, 227 U.S.P.Q. 773, 777 (Fed. Cir. 1985).

For an obviousness rejection to be proper, the Examiner is expected to meet the burden of establishing why the differences between the prior art and that claimed would have been obvious. (MPEP 2141(III)) “A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). To find obviousness, the Examiner must “identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does.” *Id.* Also, to establish *prima facie* obviousness of a claimed invention, the prior art references must teach or suggest all of the claim limitations. (MPEP 2143(A)(1))

Amended claim 10 recites a nonaqueous electrolyte comprising (i) a lithium salt; (ii) an electrolyte solvent; (iii) a first additive with an oxidation potential of more than 4.2 V; and (iv) a second additive compound with an oxidation potential of more than 4.2 V, which is higher in oxidation initiation potential than the first additive, and deposits oxidative products or forms a polymer film upon oxidation. The first additive and the second additive are respectively biphenyl and isopropylbenzene; vinylbenzene and ethylbenzene; toluene and t-butylbenzene; mesitylene and bromoethylbenzene; or furan and fluorobiphenyl. As amended, the claimed nonaqueous electrolyte solution does not comprise thiophene and cyclohexylbenzene as a first and second additive, respectively.

References to Kozuki are to the translation provided by the Examiner. Also, if the Examiner maintains a rejection over Kozuki, the Applicants respectfully request that the Examiner provide a full English translation.

Kozuki teaches a nonaqueous electrolyte secondary battery comprising a cathode, and anode, a separator, and a nonaqueous electrolyte that comprise an aromatic additive. Kozuki only discloses that the aromatic additive is at least one of phenylcyclohexane

(cyclohexylbenzene), biphenyl, a thiophene, diphenyl ether, terphenyl benzene, franc, and derivatives thereof. (e.g., Kozuki, [0021]) However, Kozuki fails to teach or suggest that the aromatic additive is one of a pair of a first and second additive, and that the first and second additive can be respectively biphenyl and isopropylbenzene; vinylbenzene and ethylbenzene; toluene and t-butylbenzene; mesitylene and bromoethylbenzene; or furan and fluorobiphenyl. While certain of the compounds named in Kozuki may have an oxidation initiation potential of more than or less than 4.2 V, nothing in Kozuki appears to teach selection of a pair of compounds, both with an oxidation initiation potential higher than 4.2V, but one higher and one lower than the other.

Kozuki thus does not disclose or suggest any specific combinations as claimed by the applicants. Also, Kozuki apparently does not disclose or suggest the specific compounds isopropylbenzene; vinylbenzene; ethylbenzene; toluene; t-butylbenzene; mesitylene; or bromoethylbenzene. The only mono-phenyl compounds disclosed in Kozuki are phenylpiperazine, phenylcyclohexane, divinylbenzene, dicyclohexyl benzene, phenoxytoluene, and derivatives thereof. None of the mono-phenyl compounds of claim 10 are specifically mentioned in Kozuki. Further, none of the mono-phenyl compounds of claim 10 are derivatives of the mono-phenyl compounds disclosed in Kozuki. Kozuki thus would not have prompted one of ordinary skill in the art to consider specifically claimed combinations of claim 10. Thus Kozuki does not disclose, teach or suggest the particular combinations of additives claimed by the Applicants, namely a nonaqueous electrolyte solution wherein the first additive and the second additive are respectively biphenyl and isopropylbenzene; vinylbenzene and ethylbenzene; toluene and t-butylbenzene; mesitylene and bromoethylbenzene; or furan and fluorobiphenyl. Because Kozuki does not disclose the particular combinations of additives claimed by the Applicants, Kozuki does not anticipate amended independent claim 10.

Furthermore, the Applicants respectfully assert that the synergistic results disclosed by the Applicants further support the patentability of the instant claims. For example, the Applicants disclose in Examples 6 to 11 the results using the additives isopropylbenzene, vinylbenzene, toluene, mesitylene, and furan with biphenyl, ethylbenzene, t-butylbenzene, bromoethylbenzene, and fluorobiphenyl, respectively. (Specification, p. 22, Table 4) For at

least the reason that Kozuki does not teach or suggest the first additives isopropylbenzene, vinylbenzene, toluene, mesitylene, thiophene, or furan, one of ordinary skill in the art would not have been prompted to consider adding such compounds to a nonaqueous electrolyte, let alone expect the unexpected and synergistic improvement in overcharge performance disclosed by the Applicants.

Accordingly, for at least these reasons, Kozuki does not anticipate or render obvious the subject matter of independent claim 10. Claims 11-14 and 18-22 depend from claim 10, and thus include the allowable elements of claim 10. Thus the dependent claims are patentable over the cited references for at least the reasons given above for independent claim 10.

Accordingly, reconsideration, withdrawal of the rejection of claims 10-14 and 18-22 under 35 U.S.C. § 102(b), or in the alternative under 35 U.S.C. § 103(a), and allowance of the instant claims are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 10-14, 16-22, and 24-25 stand rejected under 35 U.S.C. § 103 as being allegedly obvious over Hinohara et al. (JP 2003-257479, hereinafter “Hinohara”) in view of Kozuki.

According to the Examiner, Hinohara discloses the claimed invention except for specifically teaching that the first additive is specifically thiophene and the second additive is specifically phenylcyclohexane. (Final Office Action, p. 7) Kozuki is cited for its teaching of a nonaqueous electrolyte secondary battery including an electrolyte with an aromatic additive, in particular at least one of cyclohexylbenzene, biphenyl, a thiophene, diphenyl ether, terphenyl, a franc, and derivatives thereof.

Applicants first note that Hinohara discloses that an aromatic hydrocarbon compound is used only as an auxiliary additive, and simply to aid in preventing an overcharge effect of a fluorine atom-substituted aromatic compound. However, as admitted by the Examiner, Hinohara fails to teach or suggest that the aromatic hydrocarbon compound consist of a pair of a first and second compound, where the first and second compounds can be, respectively, biphenyl and isopropylbenzene; vinylbenzene and ethylbenzene; toluene and t-butylbenzene;

mesitylene and bromoethylbenzene; or furan and fluorobiphenyl. The Examiner appears to consider it obvious to simply substitute the compounds of Kozuki for the compounds of Hinohara, but as explained above, this combination does not result in the claims as amended. Kozuki further does not teach using a specific combination of additives, both with an oxidation initiation potential of higher than 4.2 V, but one higher than the other. In the absence of this teaching, one of ordinary skill in the art would not have been motivated to select the specific pairs of compounds now claimed. There is nothing in Hirohana or Kozuki that would have led one of ordinary skill in the art to these claimed combinations, and nothing to suggest the synergistic results obtained from their use.

Claims 10-14, 16-22, and 24-25 further stand rejected under 35 U.S.C. § 103 as being allegedly obvious over Watanabe et al. (WO 02/31904/US, hereinafter “Watanabe”). It is believed that this rejection is meant as over Watanabe in view of Kozuki. Again according to the Examiner, Watanabe discloses the claimed invention except for specifically teaching that the first additive is specifically thiophene and the second additive is specifically phenylcyclohexane (cyclohexylbenzene). Kozuki is cited as supplying this missing element. (Final Office action, pages 9-10)

Watanabe discloses that two or more organic compounds selected from o-terphenyl, triphenylene, cyclohexylbenzene and biphenyl. Kozuki does not remedy the deficiencies of Watanabe for the same reasons as set forth above, i.e., Kozuki does not teach or suggest a pair of compounds, each having an oxidation initiation potential of more than 4.2 V, with one higher than the other; and Kozuki does not teach the specific pairs where the first and second compounds can be, respectively, biphenyl and isopropylbenzene; vinylbenzene and ethylbenzene; toluene and t-butylbenzene; mesitylene and bromoethylbenzene; or furan and fluorobiphenyl. There is nothing in Watanabe or Kozuki that would have led one of ordinary skill in the art to these claimed combinations, and nothing to suggest the synergistic results obtained from their use.

Accordingly, for at least these reasons, Hinohara in view of Kozuki or Watanabe in view of Kozuki does not render obvious the subject matter of independent claim 10. Claims

11-14 and 18-22 depend from claim 10, and thus include the allowable elements of claim 10. Thus the dependent claims are patentable over the cited references for at least the reasons given above for independent claim 10.

Accordingly, reconsideration, withdrawal of the rejection of claims 10-14 and 18-22 under 35 U.S.C. § 103(a), and allowance of the instant claims are respectfully requested.

Conclusion

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejections and allowance of the claims are respectfully requested.

Applicants hereby petition for any necessary extension of time required under 37 C.F.R. 1.136(a) or 1.136(b) or any other necessary fees(s), which may be required for entry and consideration of the present Reply.

If there are any additional charges due with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicants' Attorneys.

Respectfully submitted,

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